



U.S. Department
of Transportation
**Federal Highway
Administration**

Louisiana Division

5304 Flanders Drive
Suite A
Baton Rouge, LA 70808

July 16, 2007

Mr. Johnny B. Bradberry, Secretary
Department of Transportation
and Development
Baton Rouge, Louisiana

In Reply Refer To:
Funding Preventive
Maintenance with
Highway Bridge Program
(HBP) Funds

Attention: Ms. Janice Williams, P.E.
Chief, Systems Engineering Division

Dear Mr. Bradberry:

Ms. Janice Williams' July 3, 2007, letter submitted LA DOTD's Bridge Preventive Maintenance Program – Systematic Process for review and requested the allowance of funding specific preventive maintenance activities on bridges using Highway Bridge Program (HBP) funds under the provisions of Title 23 USC Section 144 as amended by SAFETEA-LU Section 1114. Our office has reviewed the information provided and approves the utilization of HBP funds for the activities included within the LA DOTD Bridge Preventive Maintenance Program – Systematic Process provided with Ms. Williams' July 3, 2007 letter.

Under the current HBP special rule for preventive maintenance, the approved systematic preventive maintenance activities may be carried out for highway bridges without regard to whether the bridge is eligible for replacement or rehabilitation. Preventive bridge work activities of the type proposed within the bridge preventive maintenance program should be coded "47 – Systematic Preventive Maintenance" in the Fiscal Management Information System (FMIS).

Our office requests that the HBP funds usage be closely monitored, along with the bridge conditions influence by the program in the event the funds need to be better directed or program adjustments need to be made. Since this is a new program, we also request that an annual report by October 15th of each year be submitted to our office advising on the program status (HBP funds programmed), accomplishments (number of bridges affected, their location, and activities types), and any adjustment that might be contemplated based on the program efforts or observations.

If you have any questions or need clarification, please let us know.

Sincerely,

Mary Stringfellow
Technology Management Systems Engineer

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HIGHWAY BRIDGE PROGRAM FUNDING OF PREVENTIVE MAINTENANCE ACTIVITIES

INTRODUCTION AND REQUEST

The Louisiana Department of Transportation and Development (LADOTD) would like to receive the flexibility to devote a portion of its Highway Bridge Program (HBP) allocation toward funding bridge preventive maintenance activities. These activities will serve to extend the service life of bridges in a cost effective manner while maintaining the current level of safety.

Our focus is on bridges in good structural condition that are deteriorated, damaged or exhibiting deficient bridge elements. The various bridge preventive maintenance activities considered are: joint repair and replacement, bearing repair and replacement, localized deck repairs, spot painting, deck sealing, grid deck section repair or localized section replacement, concrete spall repair on pedestals, bents, caps, piling, piers and columns and bridge deck drainage (see Table 1 for Selection Criteria).

Our request for funding flexibility will allow us to do the right work on the right bridge at the right time, thereby extending the service life of our bridge structures. In this request, it is our intention to highlight the successes of our current bridge program and clearly define the systematic process for the bridge preventive maintenance program.

SYSTEM OVERVIEW

HIGHWAY BRIDGE PROGRAM

The goal for the bridge program is to use, as congress intended, a portion of the Highway Bridge Program funds to replace or rehabilitate deficient highway bridges so they would no longer be deficient. The LADOTD has developed a standard operations manual as guidance for project delivery. The manual is titled "Program Development and Project Delivery System Manual." In the initial phase of a project (Stage 0), it helps to systematically identify candidate projects and considers project feasibility and funding. In subsequent stages, it continues with environmental concerns, identification of funding, design, etc.

Bridge preservation is emphasized in current state law, in current federal law, in the DOTD Strategic Plan and in the Federal Highway Administrations' National Strategic Plan. Therefore, it is critical to have an effective Bridge Preservation Program. The Stage 0 process will aid in providing an effective program. The Stage 0 process for on-system bridge projects is described in the following paragraphs.

A list of potential structures that qualify for replacement or rehabilitation funding under the Federal Highway Bridge Program and are not currently scheduled for any construction action is compiled by the On-System Bridge Program Manager. The list of potential structures is distributed to the District offices for their review. The District offices will submit a list of bridge replacement projects in priority order based on potential structures and the needs of the District. A Stage 0 Preliminary Scope and Budget Checklist, a Stage 0 Environmental Checklist, and a Stage 0 Structural Site Survey is available to aid in the preparation of Stage 0 studies. These forms are prepared by District personnel and submitted with each proposed project. The survey and checklists are used to aid in the decision making process.

The On-System Bridge Program Manager will refine the District's priority list by considering truck routes, average daily traffic, route continuity, structure age, material, condition, crash data, construction cost estimate, and available program funds. A cost estimate is prepared by the Program Manager based on preliminary information provided by the District. This information is used to determine the approximate number of structures that will be on the refined proposed project list. The Program Manager compiles a Stage 0 study in order to provide sufficient decision making information to the Bridge Preservation Project Selection Team. A Stage 0 study may include but is not limited to the following items:

- a. Executive summary
- b. Stage 0 checklist
- c. Stage 0 structural site survey
- d. Stage 0 environmental checklist
- e. Cost estimate
- f. Photographs of the structure and project site

Due to these considerations, a more refined project list is established that meets the Districts' needs.

The Stage 0 study for on-system bridge preservation projects is checked for completeness and reviewed by the On-System Bridge Preservation Program Manager. The Program Manager must acquire the lead Bridge Design Engineer's approval before submitting the list to the Project Selection Team. The team will decide which projects proceed to Stage 1, Planning and Environmental. It is the Program Manager's responsibility to ensure that project numbers are obtained by the appropriate departmental personnel and to make the necessary contacts to initiate Stage 1.

Any significant changes to the approved project scope or budget must be submitted to the Program Manager for approval. Changes to the budget may need to be brought to the Project Delivery Steering Committee, particularly if the Budget Partition is impacted.

The bridge program staff has effectively and successfully allocated funds in a cost effective manner to counter the deterioration effects of our bridge structures. Shown in the Appendix and depicted in Figure 1, the number of deficient bridges has steadily declined since 1992, with a total reduction of 5.2% over the 14 year range. Figure 2 shows that the

structurally deficient bridges have declined from 6.8% to 3.8%, or almost half in number, over the same time period.

BRIDGE MAINTENANCE PROGRAM

The LADOTD's Bridge Maintenance Program started about 1970 or about the time the interstate construction era was winding down. From the programs' inception until the early 1980's, preventive maintenance efforts were employed and focused on retarding deterioration while maintaining functionality. However, since this time and because of budget limitations, we have mainly employed responsive efforts which focus on corrective/emergency actions of deteriorated or damaged elements of bridges in good condition.

In the Appendix and depicted in Figure 3, the majority of our on-system bridges have an overall structure rating of five or greater. However, 9.4% have a rating below five. With an aggressive preventive maintenance program, our intent is to try preventing a good portion of these bridges from slipping below the five rating. It is prudent and cost-effective to address bridge deficiencies earlier in the deterioration phase while repairs are not so extensive to warrant major rehabilitation. The flexibility with preventive maintenance funding will be a great compliment to our bridge program. It will help to maintain our bridge structures at a higher sufficiency level and overall structure rating.

BRIDGE PREVENTIVE MAINTENANCE PROGRAM – SYSTEMATIC PROCESS

In an effort to facilitate infrastructure improvements and improve LADOTD's network of bridges, it is our intention to apply bridge preventive maintenance activities, in a timely manner, to certain bridge structures resulting in an overall benefit to the bridge system.

Bridge candidates will be selected based on a systematic process as shown in Table 1. The districts will receive a list of candidate bridges and will prioritize projects or activities based on local conditions and needs, with the first priority as preservation of bridges on Interstate or Urban NHS routes, followed by Rural NHS routes and then SHS routes. Districts may combine several element-specific projects into one construction project to facilitate competitive bidding. The Bridge Preventive Maintenance Selection Committee (BPMSC) will review the district's priority list and make final selections. The BPMSC consists of the: Chief of Systems Engineering, Bridge Program Manager, Bridge Maintenance Manager, Bridge Preventive Maintenance Engineer, Bridge Management Systems Engineer, and Highway Program Engineer. The approved project list will be sent to the districts to initiate plan development.

Candidates for the "joints" deficient item (see Table 1) targets deficient fixed or expansion joints on good bridges. The aim is preventing safety issues with loose armored plates and/or contamination of the substructure elements by water and chlorides leaking through the joint seals. The "substructure" deficient item focuses on repairing spalls on common

substructure elements on good bridges. The “deck and superstructure” deficient item concentrates on maintaining the primary elements in good condition to preserve the structural integrity of the bridge. The “bridge deck drainage” item addresses water drainage and safety concerns due to ponding and excessive runoff from restricted drain openings. If a candidate bridge needs a multitude of preventive maintenance activities, rehabilitation or replacement of the structure will be considered (see Chart 1 for guidance).

The systematic process shown in Table 1 and Chart 1 is the guidance used for determining which bridge structure and structure items to address. Our database of bridge inventory and inspection data will be utilized as a resource for applying this process.

Table 1 – Bridge Preventive Maintenance Activity Selection Criteria

Deficient Item	Bridge Preventive Maintenance Activity Selection Criteria	Objective
Joints	Bridges with DSS* condition** ratings ≥ 5 and with adjective** joint ratings ≤ 7 (all joint types***)	Repair/replace deficient joints to prevent water and chlorides from falling onto substructure elements.
Substructure	Bridges with DSS condition ratings ≥ 5 and with adjective substructure element ratings ≥ 2 and concrete spall/scale ratings ≤ 7	Repair/replace substructure deficiencies such as: concrete spall repair on pedestals, bents, caps, piling, piers and columns
Deck & Superstructure	Bridges in generally good condition with DSS condition ratings ≥ 5 and with adjective deck or superstructure element ratings ≤ 7	Repair the deficient deck or superstructure elements and extend the non-deficient life of the bridge. [▲]
Bridge Deck Drainage	Bridges in generally good condition with DSS ratings ≥ 5 and with adjective drainage ratings of 5, 6, or 7	Clean the bridge deck drains to prevent ponding and excessive runoff to bridge joints.

* DSS = Deck (58) and Superstructure (59) and Substructure (60) items

** see below for “condition” and “adjective” ratings

*** Includes deck joints and joint seals items

▲Ex. Localized deck repairs, deck sealing, spot painting, bearing repair/replacement, grid deck repairs and localized section replacement.

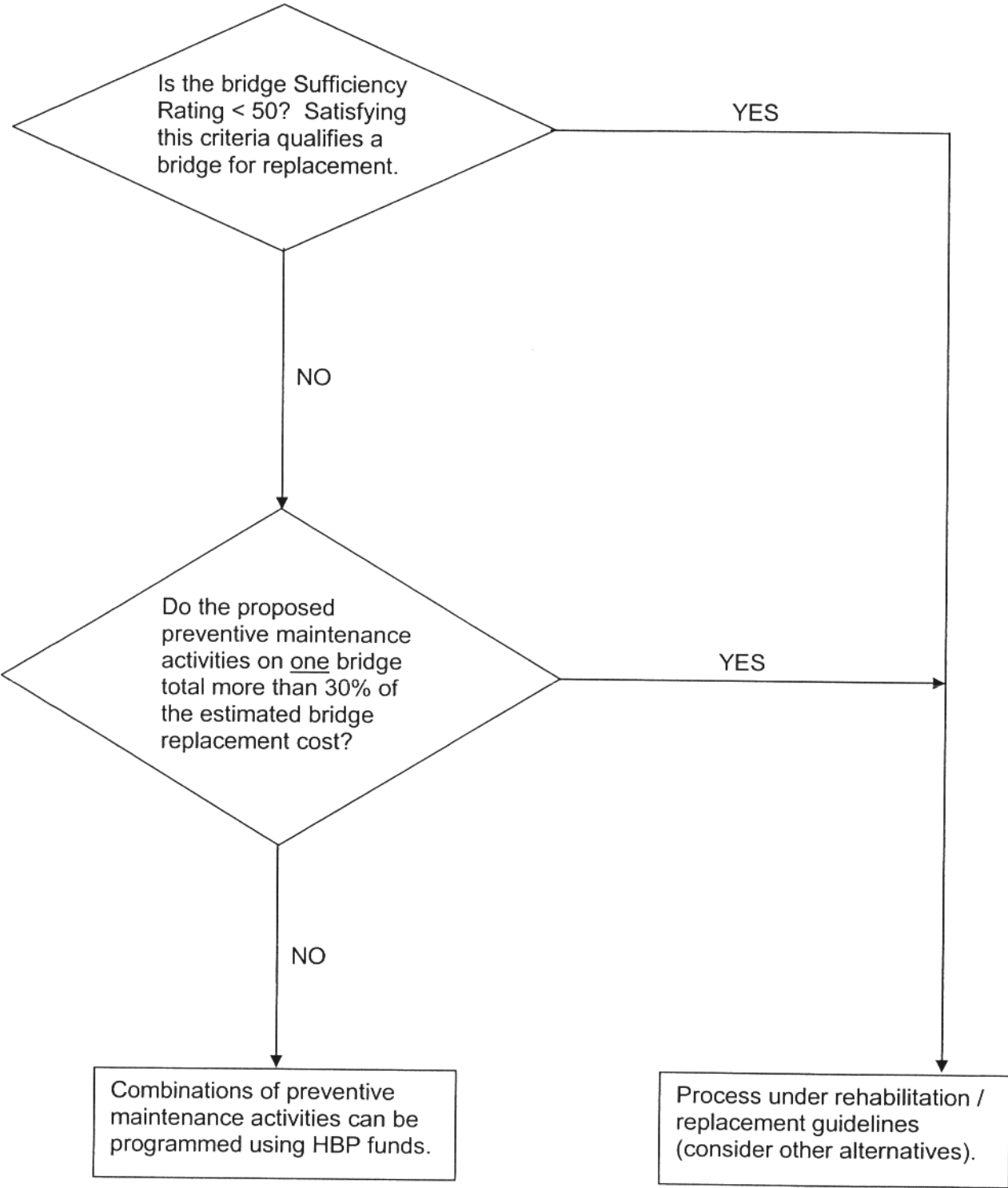
CONDITION RATINGS

- N **NOT APPLICABLE**
- 9 **EXCELLENT CONDITION**
- 8 **VERY GOOD CONDITION** - no problems noted
- 7 **GOOD CONDITION** – some minor problems
- 6 **SATISFACTORY CONDITION** – structural elements show some minor deterioration
- 5 **FAIR CONDITION** – all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
- 4 **POOR CONDITION** - advanced section loss, deterioration, spalling, or scour.
- 3 **SERIOUS CONDITION** – loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
- 2 **CRITICAL CONDITION** – advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
- 1 **“IMMINENT” FAILURE CONDITION** – major deterioration or section loss present in critical structural components, or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put bridge back in light service.
- 0 **FAILED CONDITION** – out of service; beyond corrective action.

ADJECTIVE RATINGS

- 9 The item is in new condition with no maintenance necessary.
- 8 The item is in good condition with no maintenance necessary.
- 7 The item is in fair condition, but requires maintenance.
- 6 The item is performing the function for which it is intended, but requires maintenance.
- 5 The item is still performing the function for which it was intended at a minimum level, but requires maintenance.
- 4 The item is still performing the function for which it was intended at a minimum level, but requires major rehabilitation.
- 3 The item is still performing the function for which it was intended at a minimum level, but requires replacement.
- 2 The item is not performing the function for which it was intended, requires maintenance.
- 1 The item is not performing the function for which it was intended, and requires major rehabilitation.
- 0 The item is not performing the function for which it was intended, and requires replacement.

Chart 1 – Preventive Maintenance vs. Rehabilitation Flowchart



FUTURE DIRECTION

The LADOTD recognizes the importance of a well-maintained transportation system. With the release of HBP funds for preventive maintenance, this agency's aim is to utilize a portion of these federal-aid funds to extend the service life of existing bridges while maintaining the current level of safety. The focus will be addressing borderline deficient bridges to keep them in a "good" (non-deficient) state, thereby maintaining current overall conditions.

Upon approval of the preventive maintenance program, the agency can adopt a "preventive maintenance first" approach to serve specific bridge needs. This approach will address the borderline deficient bridges by employing applicable activities before the bridge structure deteriorates further. It is our intent to promote and implement preventive maintenance activities fundable within the Highway Bridge Program.

We are aggressively implementing a sophisticated Bridge Management System by using the AASHTOWare program Pontis. Currently, we have completed deterioration models, element quantities for all bridges and have a sample of approximately 400 bridges with element-level inspection data in Pontis. By years' end, we will have started training some of our bridge inspectors for Pontis element-level inspections. We are expecting to have all district inspectors trained and performing Pontis inspections within two years.

CONCLUSION

It is the LADOTD's goal to apply a systematic procedure to bridge structures in good overall condition that are exhibiting deficient bridge elements. This initiative will allow us to fund bridge preventive maintenance activities and extend the structural element and bridge service lives. An aggressive and strong preventive maintenance program is needed to slow the deterioration process for our bridge structures. This program will allow us to efficiently manage our bridge assets by effectively using a portion of HBP funds. We are requesting this flexibility in funding in an effort to enhance our ability to efficiently manage our bridge assets.

APPENDIX – FIGURES

Figure 1: LA Statewide Bridge Condition Trend 1992-2006 (NHS Bridges)
(combined structurally deficient & functionally obsolete)

Figure 2: LA Statewide Bridge Condition Trend 1992-2006 (NHS Bridges)
(separated structurally deficient & functionally obsolete)

Figure 3: Distribution of Overall Bridge Structure Ratings
(Data Source: LADOTD Database – April 2007)

Figure 4: Trendline Overall Bridge Structure Ratings (on-system bridges)
(Data Source: LADOTD Database – April 2007)

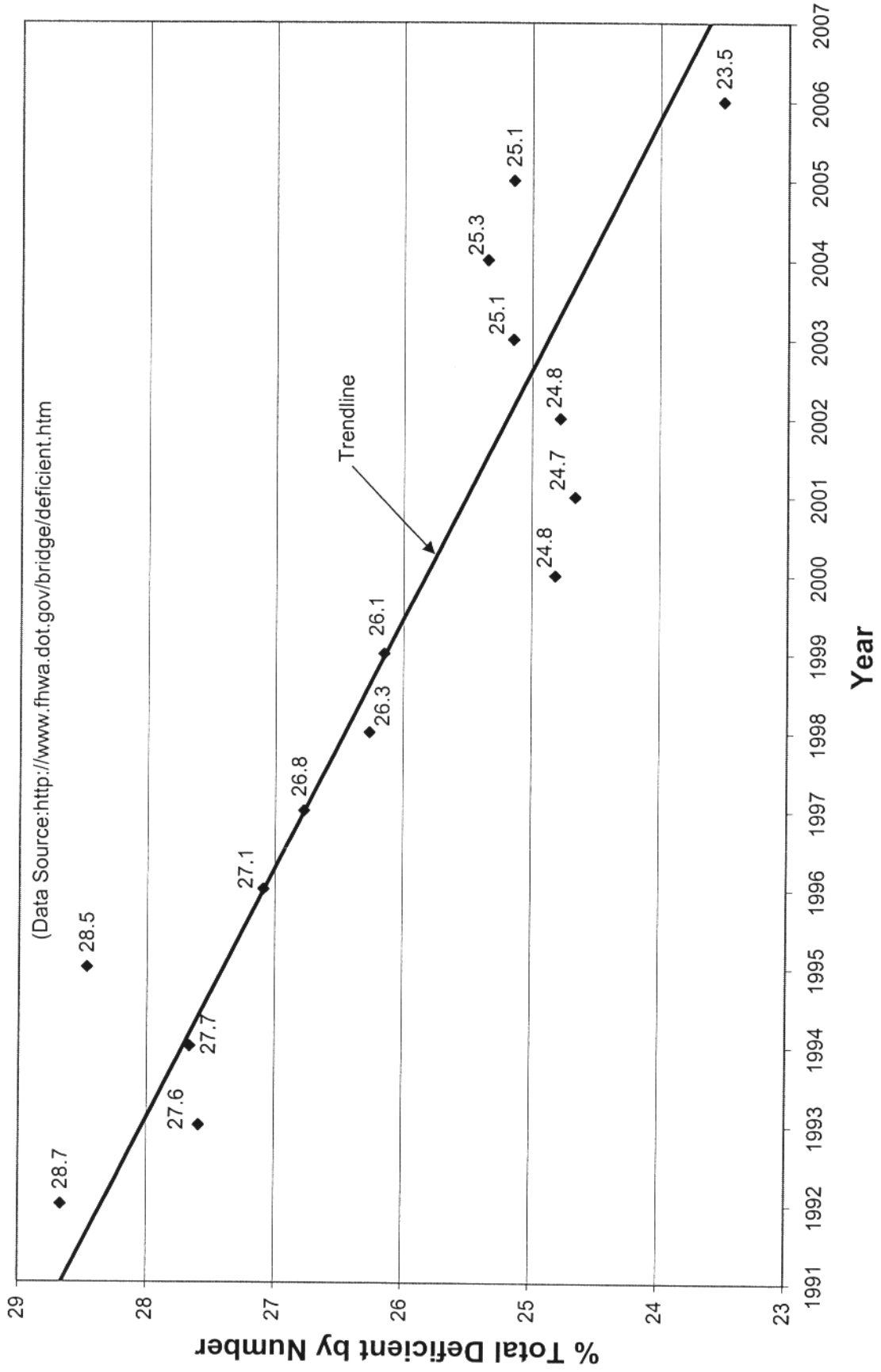
“Overall Bridge Structure Ratings” (Figures 3 & 4)

The “Overall Bridge Structure Rating” is the lowest adjective rating number (0-9) which is assigned to a primary traffic-carrying member (those parts that directly support traffic). It is intended for the Department’s internal use only.

The Primary Traffic-Carrying Members are:

- Deck
- Girders
- Trusses
- Lower & upper chords
- Diagonals & verticals
- Floor beams
- Stringers
- Bearings
- Abutments
- Bents
- Caps
- Pedestals
- Columns
- Footings
- Piling
- Foundations
- Piers

**Figure 1: LA Statewide Bridge Condition Trend 1992-2006
(NHS Bridges)**



**Figure 2: LA Statewide Bridge Condition Trend 1992-2006
(NHS Bridges)**

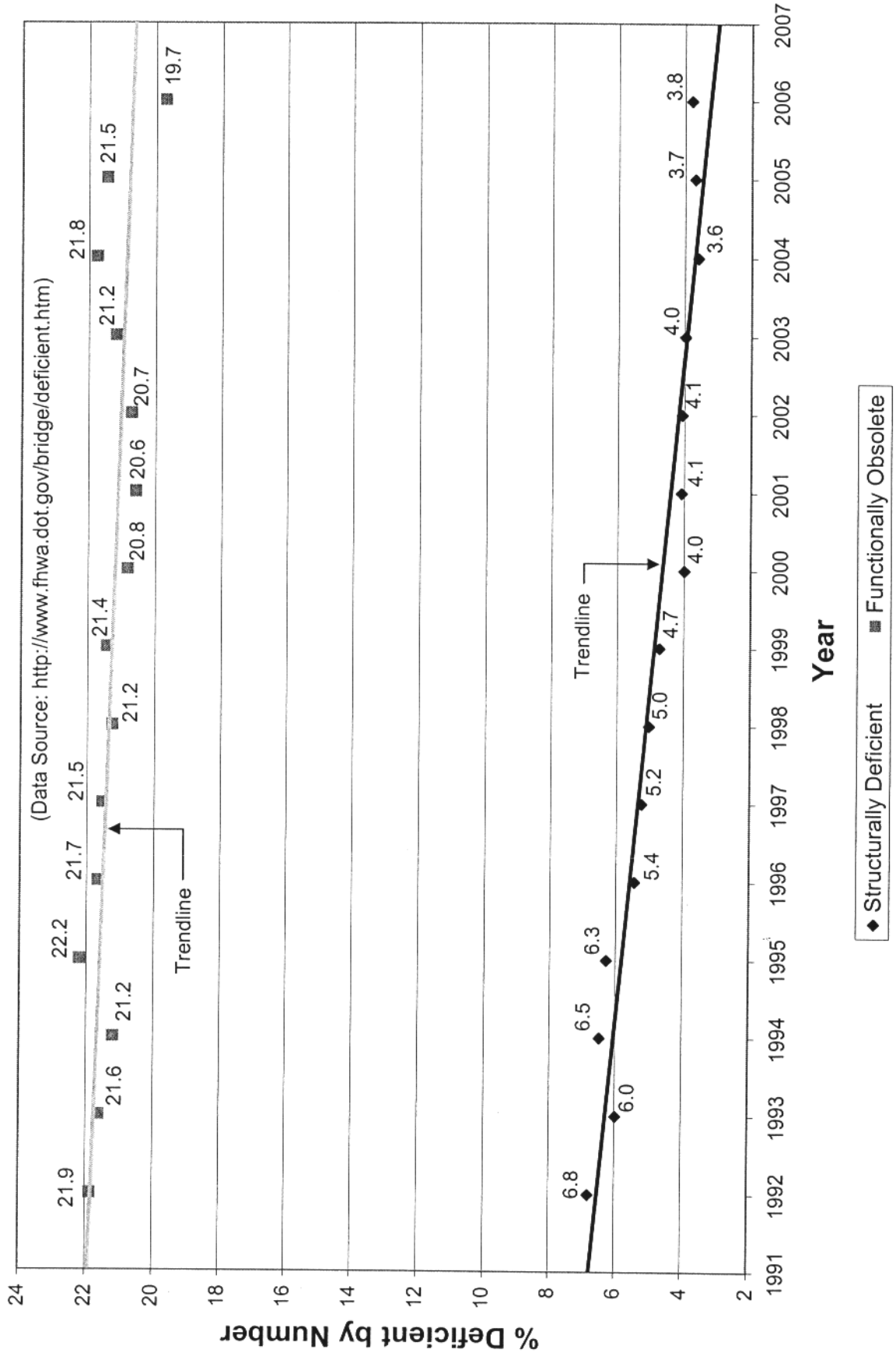
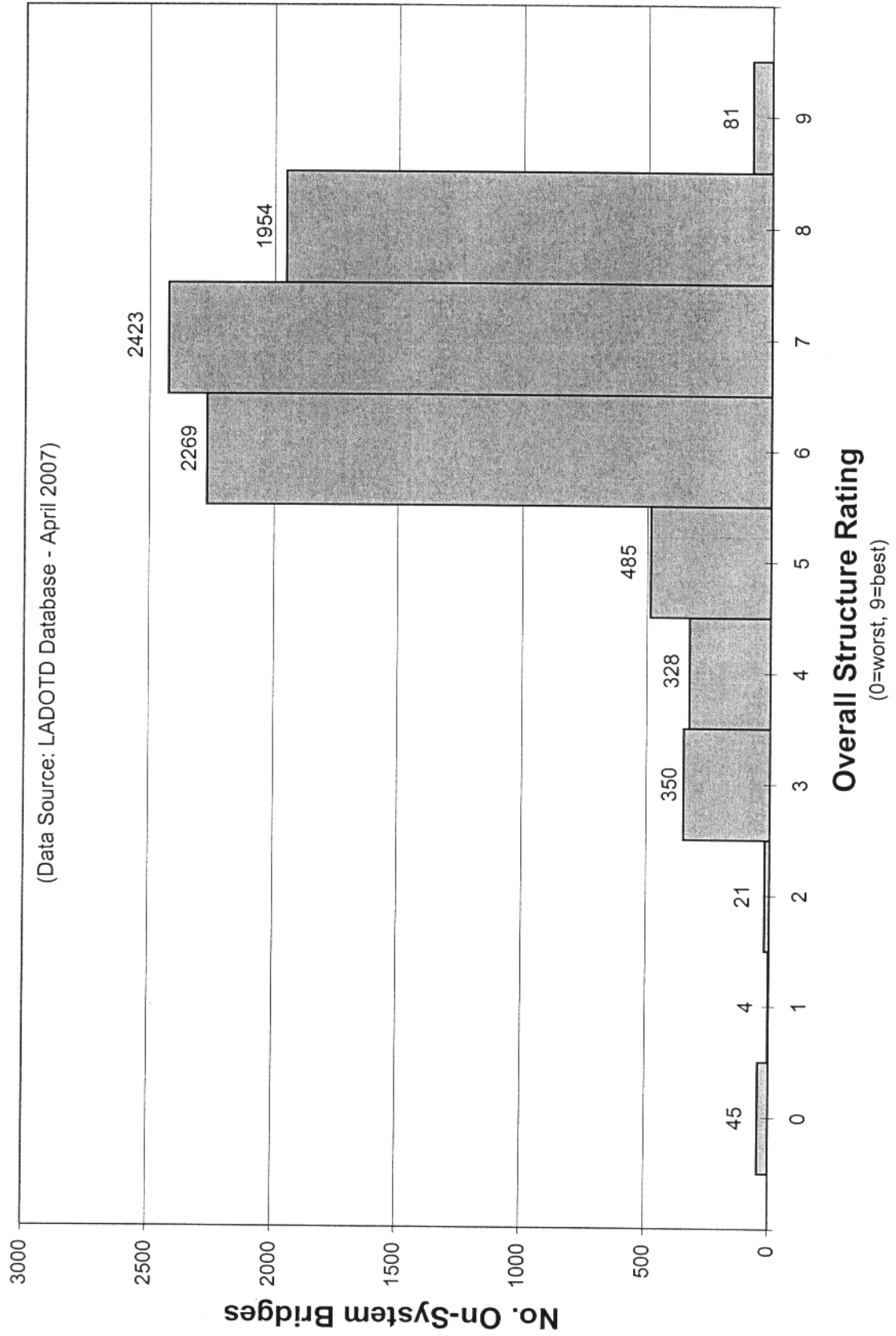


Figure 3: Distribution of Overall Bridge Structure Ratings



**Figure 4: Trendline of Overall Bridge Structure Ratings
(on-system bridges)**

